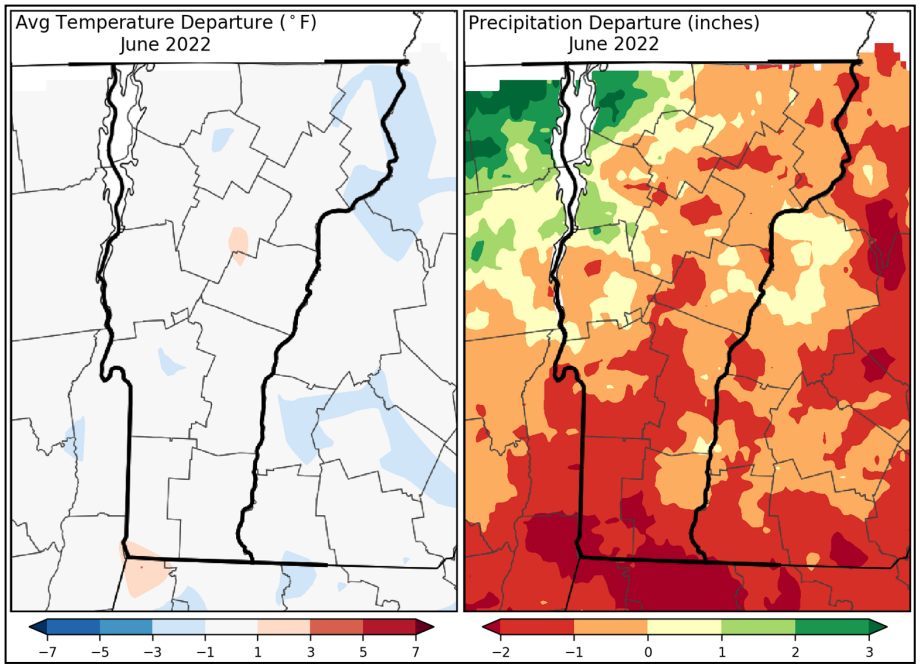
Vermont Forest Health

Insect and Disease Observations — June 2022

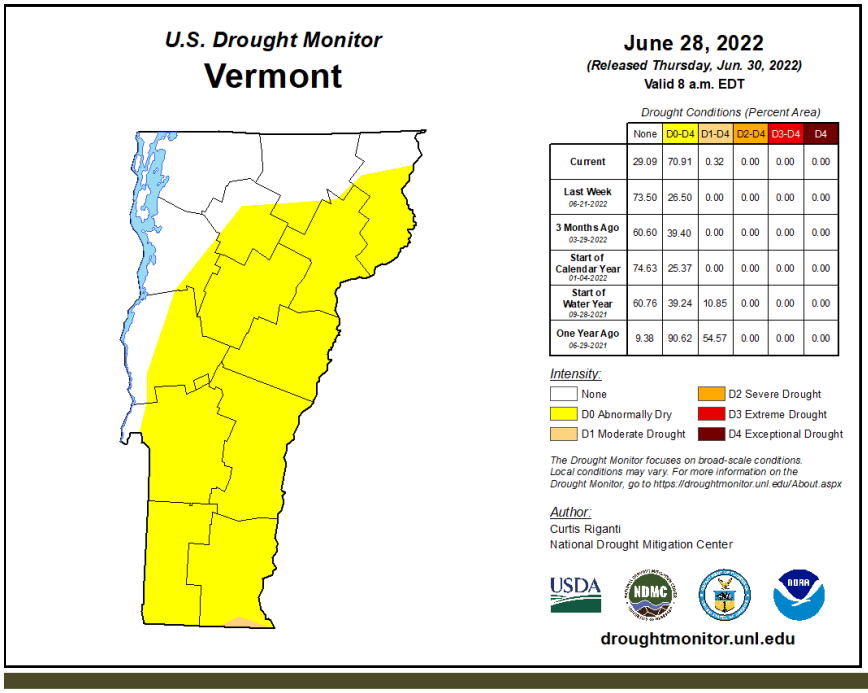
Department of Forests, Parks & Recreation
June 2022 vtforest.com

June Weather

The end of June marks the official start of summer. On average, this month was cooler and wetter than June of 2021. State-wide temperatures averaged 61.4 °F, which was 4.3 degrees cooler than June of last year. Statewide precipitation averaged 3.07 inches, which was 0.18 inches more than June of last year.



Average temperature and precipitation departure from normal. Maps and data: Northeast Regional Climate Center.



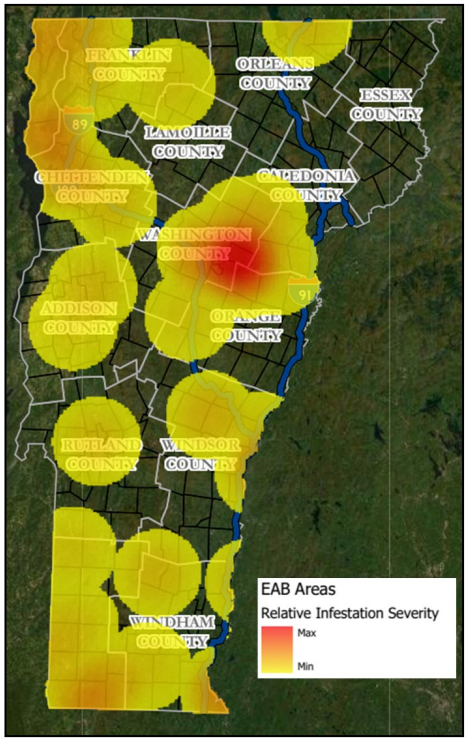
Drought Update

Although total precipitation was higher than in June of 2021, most of the state fell back into drought conditions by the end of the month. On June 7th, the U.S. Drought Monitor listed 100% of the state as no drought. By June 28th, 0.32% of the state was listed in moderate drought, 70.59% as abnormally dry, and 29.09% as no drought.

End of month drought conditions. Map and data: U.S. Drought Monitor.

Invasive Insect Update

By the end of the month, adult emerald ash borer (EAB, *Agrilus planipennis*) emergence has occurred in most parts of the state. Emergence is predicted based on growing degree days (GDD), an estimate of growth and development of plants and insects based off a temperature minimum. For EAB, this base temperature is 50°F. Once emerged, adults will lay eggs in approximately 14 days. Several new EAB detections were found by public reporting and trap trees used by the Green Mountain National Forest staff in previously unconfirmed towns. The new detections were found in the towns of Williston, Pownal and Somerset. Towns with an expansion of the infested area include Somerset, Jamaica, Stratton, Wardsboro, Hinesburg, Charlotte and Shelburne. If you are a forest landowner, homeowner, forester, logging contractor, municipality, and/or utility professional in an infested area, you should evaluate the options available to protect ash trees and immediately implement Vermont's "Slow the Spread" recommendations. For additional resources including managing ash in your woodlot or around your home, or Use Value Appraisal guidance, check out the resources available at VTinvasives.



EAB Infested Areas in Vermont. Map and data: ANR's Natural Resources Atlas.

Black arrow: Spongy moth infected with *E. maimaiga*. White arrow: Spongy moth infected with LdMNPV. Photo credit: Ken Signorello, Essex Conservation and Trails Committee.

Spongy moths (*Lymantria dispar dispar*) are both non-native and invasive insects, so even with some native predators, they will most likely always persist at low levels. Our native predators did not co-evolve with these moths, so any predation that occurs is likely not enough to have effective control. The most effective control we see in Vermont is the fungal pathogen *Entomophaga maimaiga* and the viral pathogen LdMNPV (*Lymantria dispar multicapsid nuclear polyhedrosis virus)*. The fungal pathogen *E. maimaiga* is most prevalent in the environment when we have wet and humid springs, something we did not experience last year. This moisture allows more populations of this fungus to become established, which increases the likelihood of spongy moth caterpillars becoming infected and killed. Caterpillars infected with *E. maimaiga* will die hanging vertically from the tree trunks, and spores from their corpse are dispersed into the environment. LdMNPV virus is less dependent on weather and often is more successful when populations get to an outbreak level. LdMNPV causes caterpillars to climb to elevated positions before liquefying and dying. Caterpillars infected with this virus will arch when dying, allowing the liquid contents to rain onto leaves and then be consumed and reinfect other spongy moth caterpillars.

Supplemental Sightings

Ash leaf curl aphid (*Prociphilus fraxinifolii*) damage was observed on white ash (*Fraxinus americana*) in Washington county. This aphid feeds on emerging ash leaves, causing them to become curled and distorted. This feeding and damage occurs in May and June and will persist throughout the remainder of the growing season. Heavy infestations can lead to stunted or dead shoots but is not responsible for largescale dieback or mortality.

Ash leaf curl damage. Photo credit: FPR Staff.

European pine sawfly (*Neodiprion sertifer)* was observed feeding on red pine (*Pinus resinosa*) in southern Vermont. This sawfly was introduced to North America in 1925 and is now spread throughout the eastern U.S. As early instar larvae, this insect only feeds on the surface of the needle, which causes needle discoloration. As the larvae mature into later instars, they feed on the entire needle. Like many sawflies, the larvae will rear up when alarmed.

European sawfly larvae. Photo credit: FPR Staff.

Braconid parasitoid (*Cotesia melanoscela*) cocoons have been observed with spongy moth larvae in Addison county. This parasitic wasp was introduced to the U.S. in 1912, as a spongy month biocontrol agent, and now has a self-sustaining population in the state. Female wasps lay eggs directly into spongy moth larvae, as well as, inoculates the larvae with a virus that stunts spongy moth molting and development. The parasitoid larvae, hatch, and later the second generation of wasps can reinfect spongy moth larvae. This biocontrol agent is not as successful as the previously mentioned biocontrol agents. For updated spongy moth information, visit FPR's Spongy Moth Information Page.

Braconid parasitoid cocoon. Photo credit: George Boettner, UMASS.

Red raspberry slime mold Photo credit: Kirk Nelson.

Red raspberry slime mold (*Tubifera ferruginosa*) was observed growing on deadwood in the northeast kingdom. This eukaryotic organism can live as multiple single-celled organisms, or aggregate together to form a multicellular plasmodium. In the case of red raspberry slime molds, many plasmodiums aggregate to form an aethalia (pillow-shaped body). Although commonly found on decaying wood, this organism doesn't penetrate and consume wood, it instead engulfs surface fungi, bacteria, and other microorganisms.

Wandering broadhead planarian (*Bipalium adventitium*) has been observed in southern parts of the state. This terrestrial flatworm is yellow-tan in color and has one long brown stripe on its dorsal side and has a fan-shaped head. These worms consume earthworms, slugs, larval stages of various insects, and can even be cannibalistic. This annelid is considered an emerging invasive pest, although the current distribution in Vermont is unknown. For more information, visit VTinvasives.

Wandering broadhead planarian. Photo credit: Leslie J. Mehrhoff, University of Connecticut.

Late leaf rust (causal agent: *Pucciniastrum americanum*) was observed causing chlorosis on wild raspberries (*Rubus strigosus*) in orange county. This fungal pathogen can cause premature leaf drop and a reduction in fruit quality and yield. This pathogen originally completes its lifecycle on two hosts, with the alternate host being white spruce (*Picea glauca*). However, once established white spruce is no longer required for fungal survival.

Late leaf rust infected raspberry. Photo credit: Michael Ellis, Ohio State University Extension.

Peach gummosis was observed on ornamental peach trees (*Prunus persica*) in central VT. Gummosis is a nonspecific condition where sap is extruded from stone fruit trees, which can be caused by a variety of abiotic and biotic stressors. Stressors can include but are not limited to bacterial or fungal infections, insect wounding, winter injury, improper pruning, and/or poor growing conditions. Trees affected by gummosis should be properly pruned and planted to reduce tree stress and promote vigor. If gummosis persists, the tree should be assessed for weather damage and biotic infections, and/or infestations.

Peach gummosis. Photo credit: FPR Staff.

Euonymus caterpillar (*Yponomeuta cagnagella*) was observed in a localized outbreak in Montpelier, VT. This insect is native to Europe and Asia and was first reported in North America in 1967. Its primary hosts are *Euonymus* spp., however, they do occasionally feed on other ornamental hardwoods. This defoliator can cause severe defoliation to host plants, and if this severe defoliation is successive, it can lead to dieback and mortality of infested trees.

Euonymus caterpillar webbing. Photo credit: FPR Staff.

Larch casebearer (*Coleophora laricella*) was observed causing discoloration in eastern larch (*Larix laricinia*) in Caledonia county. As larvae, this moth cuts the tip off a needle, then hollows it out. The cavity of the needle is then reinforced with silk and used as a protective shelter for pupation. This insect will be done feeding by the end of June, although the damage may be apparent for the duration of the growing season. In high populations, this feeding can lead to defoliation and an increase in tree stress.

Larch casebearer damage. Photo credit: Roger Ryan, USFS PNW Station, Bugwood.

Willow pine gall (*Rhabdophaga strobiloides*) was observed on willows (*Salix* spp.) in southern VT. These midges overwinter inside of these galls, and once emerged, lay eggs on the terminal bud of a developing branch. Larvae hatch a few weeks later, feeding within the terminal bud, stopping its development and causing abnormal bud swell and gall formation The gall that is formed provides food and shelter for the developing larvae through the winter, where they will pupate and emerge as adults in the spring.

Willow pine gall. Photo credit: FPR Staff.

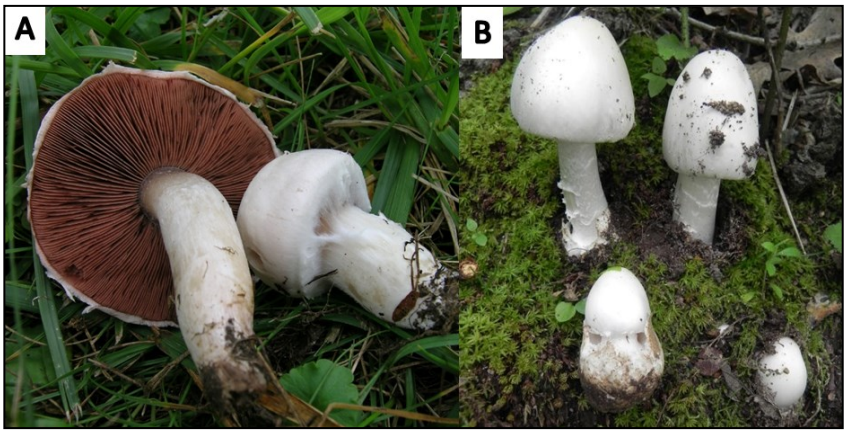
Balsam twig aphid (*Mindarus abietinus*) was observed causing twig and needle curling on balsam fir (*Abies balsamea*) in the northeast kingdom. This aphid feeds on the current year's growth which can lead to curled and twisted needles, stunted growth, and an accumulation of honeydew and sooty mold. Balsam twig aphids have three to four generations per year, and although symptoms are present almost year-round, management including mechanical and chemical control is often only effective in late spring.

Needle curling from balsam twig aphid. Photo credit: FPR Staff.

Walnut flea beetle (*Paria quadrinotata*) was observed feeding on black walnut (*Juglans nigra*) trees in Orleans county. As adults, this leaf beetle feeds primarily on the leaves, and as larvae, they feed on roots and underground stems. High populations of walnut flea beetles can lead to light defoliation, wilted leaves, and stunted plants.

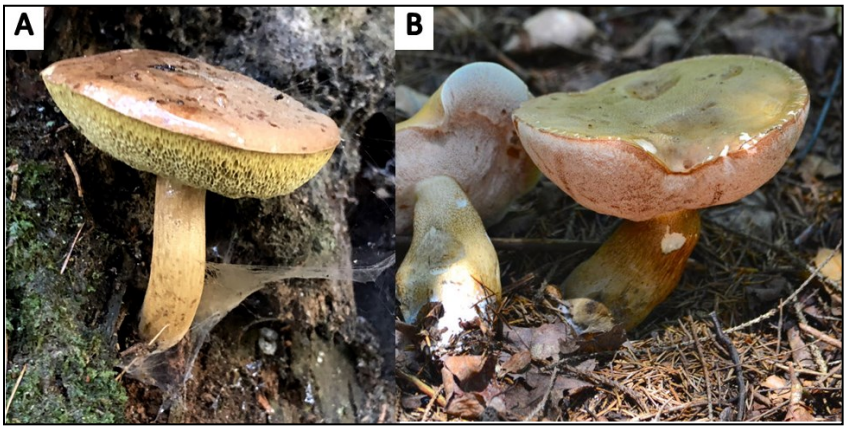
Walnut flea beetle. Photo credit: John Rosenfeld, BugGuide.

Foraging For Fungi



A: Meadow mushroom. **B:** Destroying angel. Photo credit: Michael Kuo, MushroomExpert.

Meadow mushroom (*Agaricus porphyrocephalus var. pallidus*) is an edible that is saprotrophic and can be found in fields and grassy areas, often in fairy rings. Its cap is convex and matures to broadly convex and is 4-10cm wide. The cap is white and nearly bald, and when young, has remnants of a partial veil on its margins. The underside of the cap has pink to chocolate brown free gills, that are covered by a partial veil when immature. It has a dark brown spore print. Its stem is 4-6cm long and 1-2cm thick, with a whitish ring. The stem is whitish and is bald to finely fibrillose. This mushroom can be confused with the poisonous, destroying angel (*Amanita bisporigera*). This mushroom is mycorrhizal with oaks (*Quercus* spp.) and can be found growing out of the ground near them. Its cap is convex to bell-shaped and matures to nearly flat and is 2.5-10cm wide. The cap is white and can discolor towards the center. The underside of the cap has white free to nearly free gills that are covered by a universal veil when immature. Its stem is 5.5-14cm long and 0.5-2cm thick, and is tapering near the top and flaring at the base. The stem is white with a persistent thin ring, and a volva encasing.



A: Bay bolete. **B:** Bitter bolete. Photo credit: Michael Kuo, MushroomExpert.

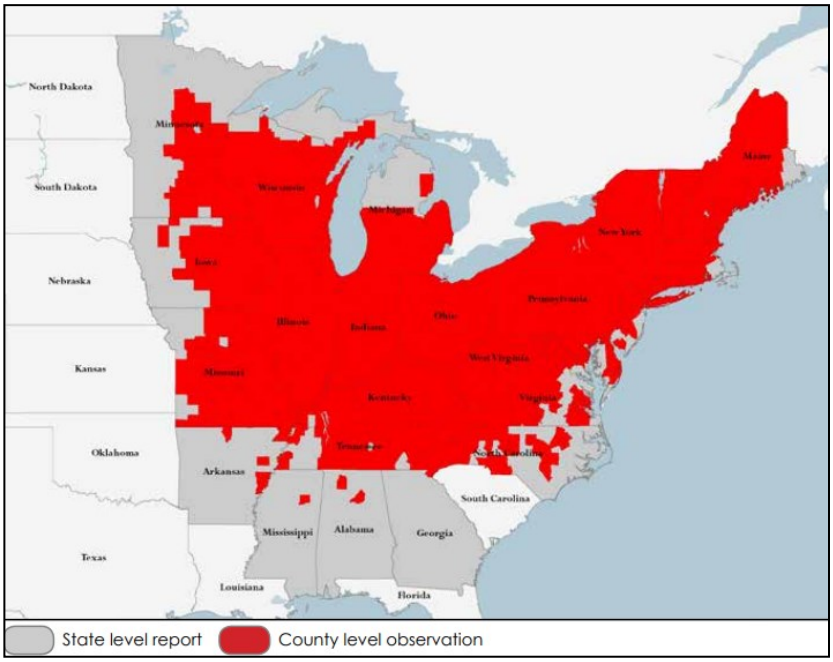
Bay bolete (*Imleria badia)* is another edible that can be found this time of year. This mushroom is mycorrhizal with conifers, especially with pines (*Pinus* spp.) and hemlocks (*Tsuga* spp.). Its cap is convex and is 3-9cm wide. When fresh, its cap is pinkish brown and sticky but dries to a leathery feel. The underside of the cap has dull yellow to olive pores that turn blue when bruised. It has an olive-brown spore print. Its stem is 5-18cm long and 1.5-4cm thick and is enlarged at its base. The stem has a gradient of color, being yellow to pale brown at the top, and brown to red-brown at the base. This mushroom has a non-poisonous (but not recommended as edible) lookalike the bitter bolete (*Tylopilus felleus*). This mushroom is also mycorrhizal with conifer species. Its cap is convex to nearly flat and is 5-13cm wide. The top of the cap is brown to tan and is dry, bald, and has a soft leathery feel. The underside of the cap is white to pink in color and turns brown when bruised. It has a brownish pink spore print. Its stem is 1-10cm long and 1.5-4cm thick and is whitish brown to tan. It is clubbed shaped and strongly reticulate.

The State of Vermont accepts no liability or responsibility for the consumption and/or misidentification of any mushrooms mentioned in this publication.

Pests in the Spotlight: Butternut Canker

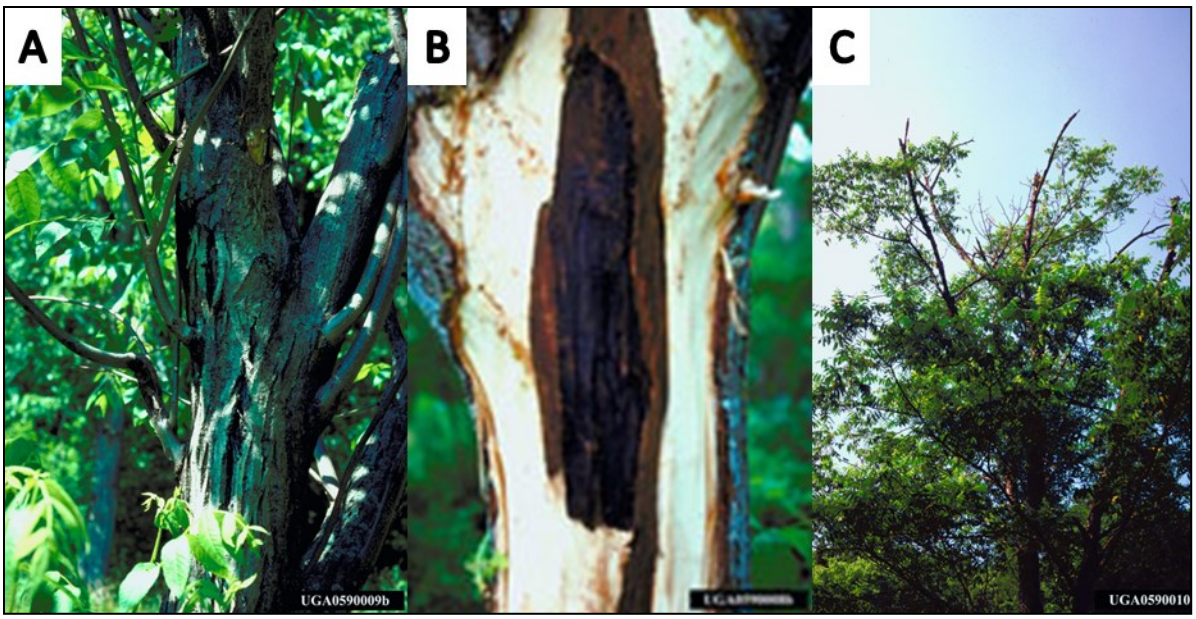
Butternut canker (*Ophiognomonia clavigignenti-juglandacearum*) is a fungal pathogen of butternut (*Juglans cinerea*), that can cause severe dieback and mortality of infected hosts. Although butternut is the primary host, it has the potential to infect other species in the walnut (Juglandaceae) family. Due to this pathogens virulence and butternut's limited resistance to this fungi, it is suspected to be non-native, however, its exact origin is unknown. This pathogen was first documented in Wisconsin in 1967 and in Vermont in 1983.

Butternut canker has been reported in 27 states throughout butternut's native range.



Current known range of butternut canker. Map and data: USDA Forest Service, Northern Research Station and Forest Health Protection.

Trees infected with this pathogen develop numerous, elongated, sunken cankers that girdle the stem and branches. Girdling leads to dieback, epicormic sprouting, and mortality. These cankers are more likely to establish in preexisting wounds, such as wounds from insect feeding, lenticels, or leaf scars, but can occur anywhere on the tree, including on buttress roots. Over time, the fungus produces stromatal columns that help the bark split open, and exposes the canker. These cankers produce spores year-round, that are disseminated by rain splash and wind, with new research ongoing to explore possible vertebrate and insect vectors. This pathogen can survive for at least two years on killed trees, where it continues to severe as a source of inoculum. For more information or to report a sighting, visit VTinvasives.



Symptoms of butternut canker.

A: Bark splits and epicormic sprouting.
B: Exposed canker.
C: Crown dieback.
Photo(s) credit: Robert L. Anderson, USDA Forest Service, Bugwood.

Early Detection Species: Privet

There are two introduced invasive species of privet known in Vermont, border privet (*Ligustrum obtusifolium*) and wild privet (*Ligustrum vulgare*). While only border privet is listed on Vermont's watchlist, both species are known to cause environmental and economic harm. Privets are part of the olive family, closely related to notable species found in New England like introduced forsythia and lilac, and locally-evolved ash.

Ligustrum obtusifolium infestation. Photo Credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.

Border privet is a perennial woody shrub that evolved in Japan, Korea, and China. Wild privet is a perennial woody shrub that evolved in northern Africa, western Asia, and Europe. These privets (along with other invasive privets that are not currently found in Vermont) were introduced to North America as screen plantings, have escaped cultivation across the continent, and occur in most U.S. states. There is sparse detailed information about the history of the introduction of these two species, though there are records of these plants being used for hundreds of years across its evolved and now introduced range. The plants' prized ability to grow densely is also one feature that makes them successful invasive plants.

Privets are marketed as direct sunlight plants but have been documented growing everywhere from human-disturbed areas to forest edges and margins and canopy openings, thickets, and shrubby successional habitats. The main mechanism for dispersal are the prolific number of seeds they produce (hundred to thousands), even in the landscaped setting. The fruit is consumed by wildlife including birds, which aid in the spread of these plants. Root suckering and resprouting can occur as well.

Impacts from these invasive privet species are not limited to sprouts popping up in lawns or marginal habitats. In states where privet is prevalent, it outcompetes locally evolved vegetation and impacts local economics by displacing regenerating forests, it's suggested that honey from privet pollen can be tainted by foul-smelling aromatics contained in the plant, and from the costs incurred for management. Though there are landscape benefits to these species, as they serve as a living fence, the documented detrimental impacts, and the continued escape and spread throughout New England are reasons border privet is listed as an early detection invasive species on Vermont's unofficial watchlist, and why they have New York Invasiveness rankings of moderate to high. There are limited populations of these two species in Vermont, so if found, please report them using the Report It! Tool on the VTinvasives.org website.

While at first glance invasive privets might look like shrub honeysuckles (which have alternately arranged leaves), or even dogwoods (whose leaves are larger), there are a few key characteristics to look for to distinguish these two invasive privets from each other:

Ligustrum obtusifolium foliage (A), and *L. vulgare* foliage (B). Photo Credit: (A) Richard Gardner, Bugwood. (B) Nava Tabak, Invasive Plant Atlas of New England, Bugwood.

Leaves

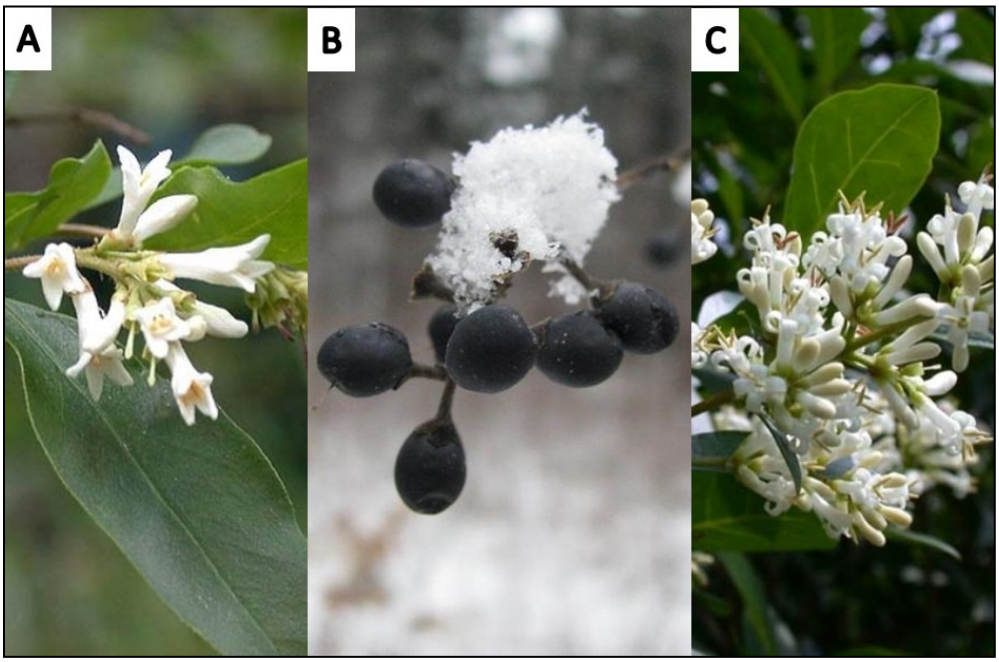
- Border privet and wild privet leaves are arranged oppositely, with smooth margins, elliptic to oblong in shape, 1-2" long, and dark green in color on top of the leaf.
- Border privet is sometimes called "blunt tipped" privet, though leaves with finer tips can be present.

Stem

- Border privet branchlets are hairy (but hairs are of varying lengths).
- Wild privet branchlets are uniformly hairy (hairs of uniform length).

Flowers and Fruit

- Both species have tubular white flowers that appear in panicles at the tips of branches, with an unpleasant odor.
- Border privet flowers' tube portion of petals are 1.5-3 times the length of the petal lobes, and the anthers are almost the length of the petals.
- Wild privet flowers' tube portion of petals are approximately as long as the length of the petal lobes, and the anthers are shorter than the length of the petals.
- Both species' fruit are round and berry-like, green turning to blackish blue.



Ligustrum obtusifolium flowers (A), and fruit (B), and *L. vulgare* flowers (C). Photo Credit: (A), (B) Leslie J. Mehrhoff, University of Connecticut, Bugwood, (C) Nava Tabak, Invasive Plant Atlas of New England, Bugwood.

Other Characteristics

- Both species' fruit are round and berry-like, green turning to blackish blue.
- Border privet can reach heights of 10-15 feet.
- Wild privet can reach heights of 20 feet.
- Leaves for both species remain on plant into late autumn.
- Both species are densely branched.

To learn more about invasive privets, check out VTinvasives and these additional resources:

- Western New York PRISM
- GoBotany – Native Plant Trust – Ligustrum obtusifolium / -- Ligustrum vulgare
- EDDMapS –Ligustrum obtusifolium / – Ligustrum vulgare

Invasive Plant Phenology

In the second full week of each month, volunteers report invasive plant phenology around the state. Those observations are compiled here, creating both a timely resource for best management options and a historic record of plant behavior. If you would like to be involved in this effort, please contact pauline.swislocki@vermont.gov. This project aspires to include observations from every county, so observers are still needed in multiple places. For more information about the phenology of invasive plants in Vermont, check out Bud Buds, a podcast from the Invasive Plant Program.

Chittenden -- Initial growth: garlic mustard; Leaves: autumn olive, black swallowwort, burning bush, butterbur, common barberry, common buckthorn, common burdock, greater celandine, goutweed, shrub honeysuckle, Japanese tree lilac, knotweed, multiflora rose, Norway maple, Phragmites, purple loosestrife, vinca, wild parsnip; Increasing leaf size: Asiatic bittersweet, autumn olive, burning bush, butterbur, common barberry, shrub honeysuckle, Norway maple, vinca, wild parsnip; Flower buds/ flower heads: black swallowwort, common barberry, common buckthorn, common burdock, dame's rocket, garlic mustard, goutweed, greater celandine, Japanese tree lilac, knotweed, multiflora rose, purple loosestrife, wild parsnip; Open flowers: black swallowwort, common barberry, common buckthorn, dame's rocket, garlic mustard, goutweed, greater celandine, Japanese tree lilac, multiflora rose, purple loosestrife, wild parsnip; Fruits: common barberry, common buckthorn, dame's rocket, garlic mustard, greater celandine, glossy buckthorn, shrub honeysuckle, Japanese barberry, multiflora rose.

Orange -- Leaves: burning bush, Norway maple; Increasing leaf size: burning bush, Norway maple; Fruits: Asiatic bittersweet, glossy buckthorn, shrub honeysuckle.

Washington -- Leaves: shrub honeysuckle, Japanese tree lilac, multiflora rose; Flower buds/ flower heads: Japanese tree lilac, multiflora rose; Open flowers: Japanese tree lilac, multiflora rose; Fruits: garlic mustard, shrub honeysuckle.

Windsor -- Leaves: dame's rocket, garlic mustard, knotweed, wild parsnip; Flower buds/ flower heads: dame's rocket, garlic mustard, wild parsnip; Open flowers: dame's rocket, garlic mustard, wild parsnip; Fruits: dame's rocket, garlic mustard.

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For more information, contact the Forest Biology Laboratory at 802-505-8259 or:

Windsor & Windham Counties	Springfield (802) 289-0613
Bennington & Rutland Counties	Rutland (802) 786-0060
Addison, Chittenden, Franklin & Grand Isle Counties	Essex Junction (802) 879-6565
Lamoille, Orange & Washington Counties	Barre (802) 476-0170
Caledonia, Orleans & Essex Counties	St. Johnsbury (802) 751-0110

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